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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,870	11/26/2003	Yuan-Zhang Han	01-2624A	9328

24114 7590 04/04/2006

LYONDELL CHEMICAL COMPANY
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EXAMINER

GRIFFIN, WALTER DEAN

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 04/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/723,870	HAN ET AL.	
	Examiner	Art Unit	
	Walter D. Griffin	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>020604</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Yen et al. (US 6,402,939 B1).

The Yen reference discloses fuels that are produced by oxidation of sulfur compounds in the fuel and then extracting the oxidized sulfur compounds. The claimed fuels are not distinguished from the fuels disclosed by Yen. See column 2, line 41 through column 3, line 9.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/093203 A1 in view of Johnstone (US 2,593,761) and Sorgenti (US 3,816,301).

The WO reference discloses a process for desulfurizing a hydrocarbon. The process comprises the contacting of the hydrocarbon with an oxidizing agent such as an organic hydroperoxide in the presence of a solid oxidation catalyst to oxidize the sulfur compounds to sulfones. The sulfones are then removed by contacting the hydrocarbon containing the oxidized sulfur compounds with an adsorbent solid such as silica/alumina. See the entire document plus paragraphs 13, 14, 16, 17, 19, 21, 22, 26, and 30 of US equivalent 2005/0000750 A1.

The WO reference does not disclose the removal of alcohol prior to the adsorption step and does not disclose the use of t-butyl hydroperoxide.

The Johnstone reference discloses that the oxidation of mercaptans with t-butyl hydroperoxide produces t-butyl alcohol. See column 1, lines 28-55 and column 2, lines 31-34.

The Sorgenti reference discloses the removal of alcohol product resulting from an oxidation process by distillation. See column 5, lines 10-12 and 47-53.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of the WO reference by using t-butyl

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hydroperoxide as the oxidizing agent because Johnstone discloses that this oxidant effectively oxidizes sulfur compounds.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of the WO reference by removing alcohol prior to adsorption as suggested by Johnstone and Sorgenti because it is known that an alcohol as claimed is produced during the oxidation step and the recovered alcohol can be used for a different productive process.

Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/093203 A1 in view of Johnstone (US 2,593,761) and Sorgenti (US 3,816,301) as applied to claim 1 above, and further in view of Herbstman et al. (US 3,565,793).

The previously discussed references do not disclose the use of a titanium-containing silicon oxide catalyst.

The Herbstman reference discloses that tertiary butyl hydroperoxide in the presence of a titanium on silica catalyst oxidizes sulfur compounds in hydrocarbons. See column 1, lines 24-28; column 4, lines 72-75; and column 5, lines 41-43 and 65-69.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the teachings of the previously discussed references by using t-butyl hydroperoxide in the presence of a titanium on silica catalyst as suggested by Herbstman because the use of such a combination results in the desired oxidation of sulfur compounds.

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Claims 7-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/093203 A1 in view of Herbstman et al. (US 3,565,793), Johnstone (US 2,593,761), Sorgenti (US 3,816,301), and Whitehurst et al. (US 6,551,501 B1).

The WO reference discloses a process for desulfurizing a hydrocarbon. The process comprises a preliminary refining stage followed by the contacting of the hydrocarbon with an oxidizing agent such as an organic hydroperoxide in the presence of a solid oxidation catalyst to oxidize the sulfur compounds to sulfones. The sulfones are then removed by contacting the hydrocarbon containing the oxidized sulfur compounds with an adsorbent solid such as silica/alumina. See the entire document plus paragraphs 13, 14, 16, 17, 19, 21, 22, 26, and 30 of US equivalent 2005/0000750 A1.

The WO reference does not disclose the organonitrogen extraction step, does not disclose the use of a titanium-containing silicon oxide catalyst, does not disclose the removal of alcohol prior to the adsorption step, and does not disclose the use of t-butyl hydroperoxide.

The Whitehurst reference discloses a process for removing nitrogen compounds from hydrocarbons by contacting the hydrocarbons with silica/alumina-containing materials or by extracting the compounds with a solvent such as a methanol and water mixture. Greater than 50% of the nitrogen compounds are removed. See column 2, lines 58-61; column 3, lines 14-18 and 30-37; column 4, lines 45-57; column 7, lines 49-63; column 8, lines 9-13 and 65-67; and column 9, lines 1-32.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of the WO reference by removing nitrogen compounds prior to oxidation as suggested by Whitehurst because a cleaner product will result.

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The Herbstman reference discloses that tertiary butyl hydroperoxide in the presence of a titanium on silica catalyst oxidizes sulfur compounds in hydrocarbons. See column 1, lines 24-28; column 4, lines 72-75; and column 5, lines 41-43 and 65-69.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the teachings of the previously discussed references by using t-butyl hydroperoxide in the presence of a titanium on silica catalyst as suggested by Herbstman because the use of such a combination results in the desired oxidation of sulfur compounds.

The Johnstone reference discloses that the oxidation of mercaptans with t-butyl hydroperoxide produces t-butyl alcohol. See column 1, lines 28-55 and column 2, lines 31-34.

The Sorgenti reference discloses the removal of alcohol product resulting from an oxidation process by distillation. See column 5, lines 10-12 and 47-53.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of the WO reference by using t-butyl hydroperoxide as the oxidizing agent because Johnstone discloses that this oxidant effectively oxidizes sulfur compounds.

It also would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of the WO reference by removing alcohol prior to adsorption as suggested by Johnstone and Sorgenti because it is known that an alcohol as claimed is produced during the oxidation step and the recovered alcohol can be used for a different productive process.

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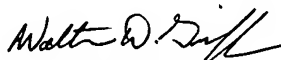
Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art reference not relied upon discloses a desulfurization process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter D. Griffin whose telephone number is (571) 272-1447. The examiner can normally be reached on M-F 6:30 to 4:00 with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Walter D. Griffin
Primary Examiner
Art Unit 1764

WG
March 31, 2006